USE OF TRMM DATA TO TEST AN IMPROVED PARAMETERIZATION OF STRATIFORM PRECIPITATION

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We successfully implemented our EAUcup parameterization of convection (Fowler and Randall 2002) in our most recent geodesic-grid version of the Colorado State University General Circulation Model (CSU GCM). Tendencies due to convection and large-scale cloud microphysics are computed using the same time-step, allowing smoother interactions between convective and large-scale moist processes. Figures 1 and 2 illustrate our most recent progress on the simulation of convective and stratiform precipitations for January. Comparisons against TRMM precipitation radar (PR) data would reveal a systematic overestima-

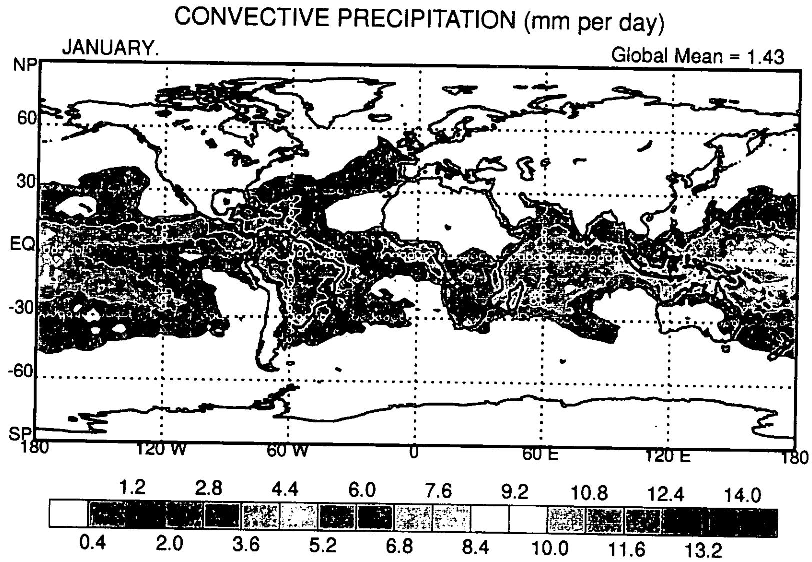

FIG. 1. Global distribution of simulated convective precipitation.

tion of the simulated monthly-mean convective rainfall over well-known areas of deep convection. One major deficiency in the global distribution of stratiform precipitation simulated in the CSU GCM is the lack of stratiform precipitation over land in the tropics, as seen in Fig. 2. This result strongly disagree with Fowler and Randall (2001) who show that convective and stratiform precipitations always coexist and that their ratio to the total precipitation is about 0.5. We believe that stratiform precipitation over land evaporates before reaching the ground because the lower troposphere remains too dry in response to the lack of convective detrainment occuring immediately above the Planetary Boundary Layer (PBL). This issue is further investigated at present.

We made significant progress in the development of our parameterization of fractional cloudiness (Randall et al. 1999). As an example of our ongoing research effort, Fig. 3 shows the global distribution of the cloud ice mixing ratio and corresponding fractional area of ice clouds at 250 hPa. These results were obtained using our latitude-longitude grid version of the CSU GCM. As seen in Fig. 3, there is a nice correspondance between areas of high (low) values of the cloud ice mixing ratio and the cloud fraction. A nice correspondance between the global distribution of the cloud water mixing ratio and fraction of water clouds in the lower troposphere can also be found (not shown). We are pursuing this effort, but in the geodesic version of the GCM. We hope to be able to make comparison of the simulated precipitation against TRMM precipitation data in the near future.

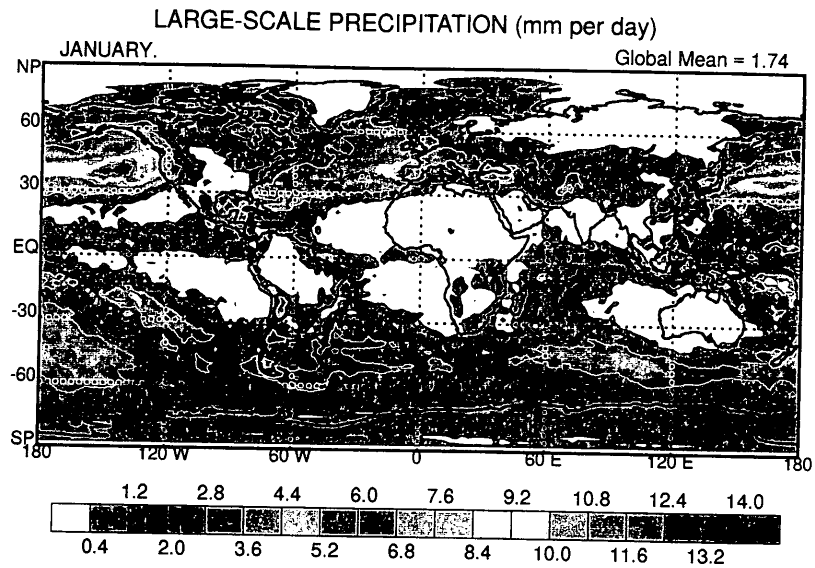

FIG. 2. Global distribution of stratiform precipitation.

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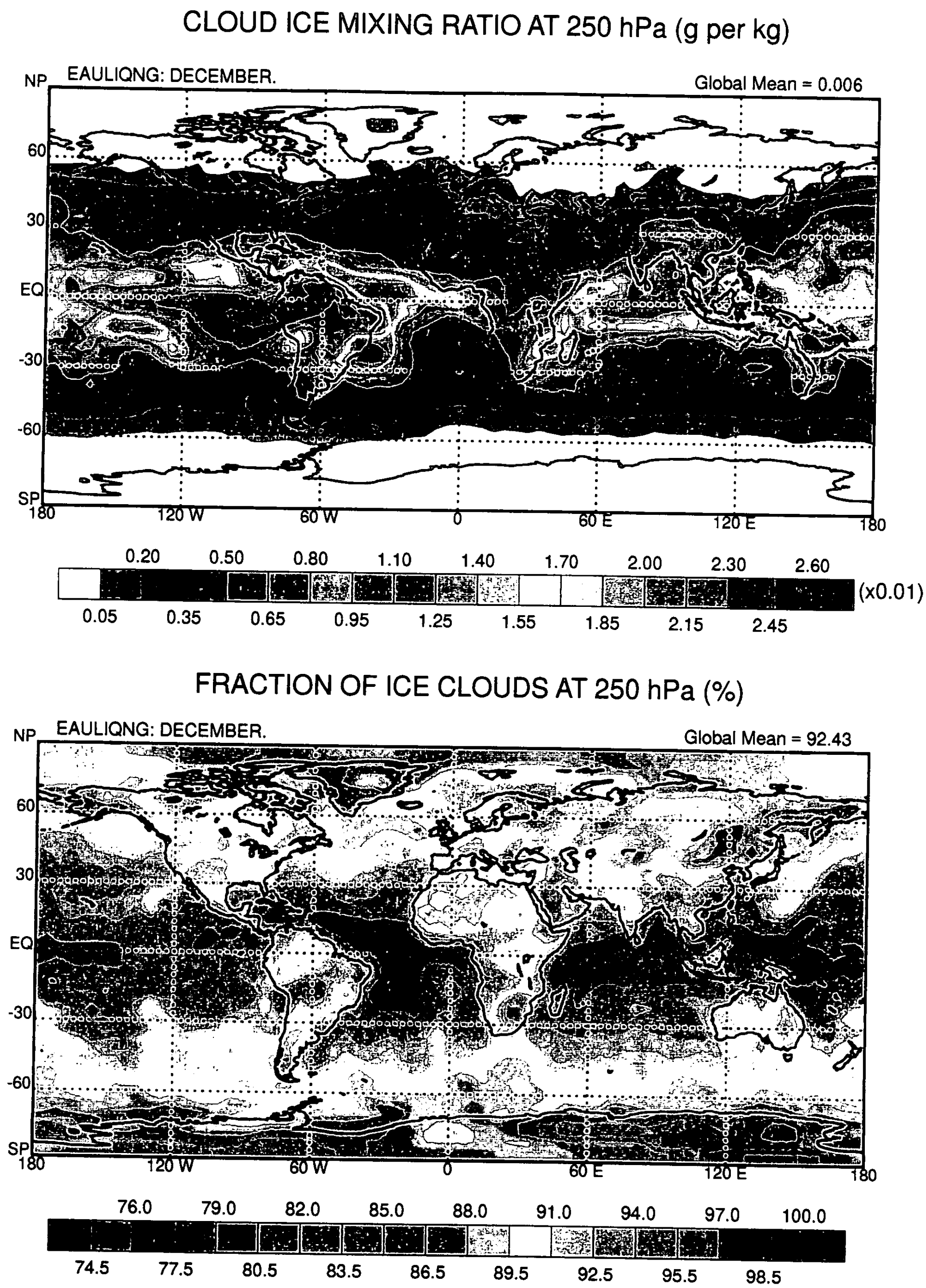

FIG. 3. Global distribution of the cloud mixing ratio and fraction of ice clouds.